



MISSISSIPPI DEPARTMENT OF
ENVIRONMENTAL QUALITY

Agricultural Chemical Groundwater Monitoring Program

2015
Annual Summary



MISSISSIPPI AGRICULTURAL CHEMICAL GROUNDWATER MONITORING PROGRAM



SUMMARY AND RESULTS

2015

MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY

OFFICE OF LAND & WATER RESOURCES

CONTENTS

INTRODUCTION.....	1
METHODOLOGY.....	3
2015 SUMMARY AND RESULTS.....	4
SECTION I. AGRICULTURAL WELLS.....	5
SECTION II. DRINKING WATER.....	6
CONCLUSION.....	8

INTRODUCTION

Over ninety percent of the population in Mississippi relies on groundwater for drinking water supply. Because of this dependence, there have been growing concerns that agricultural chemicals may be impacting and degrading the valuable groundwater resources in the state.

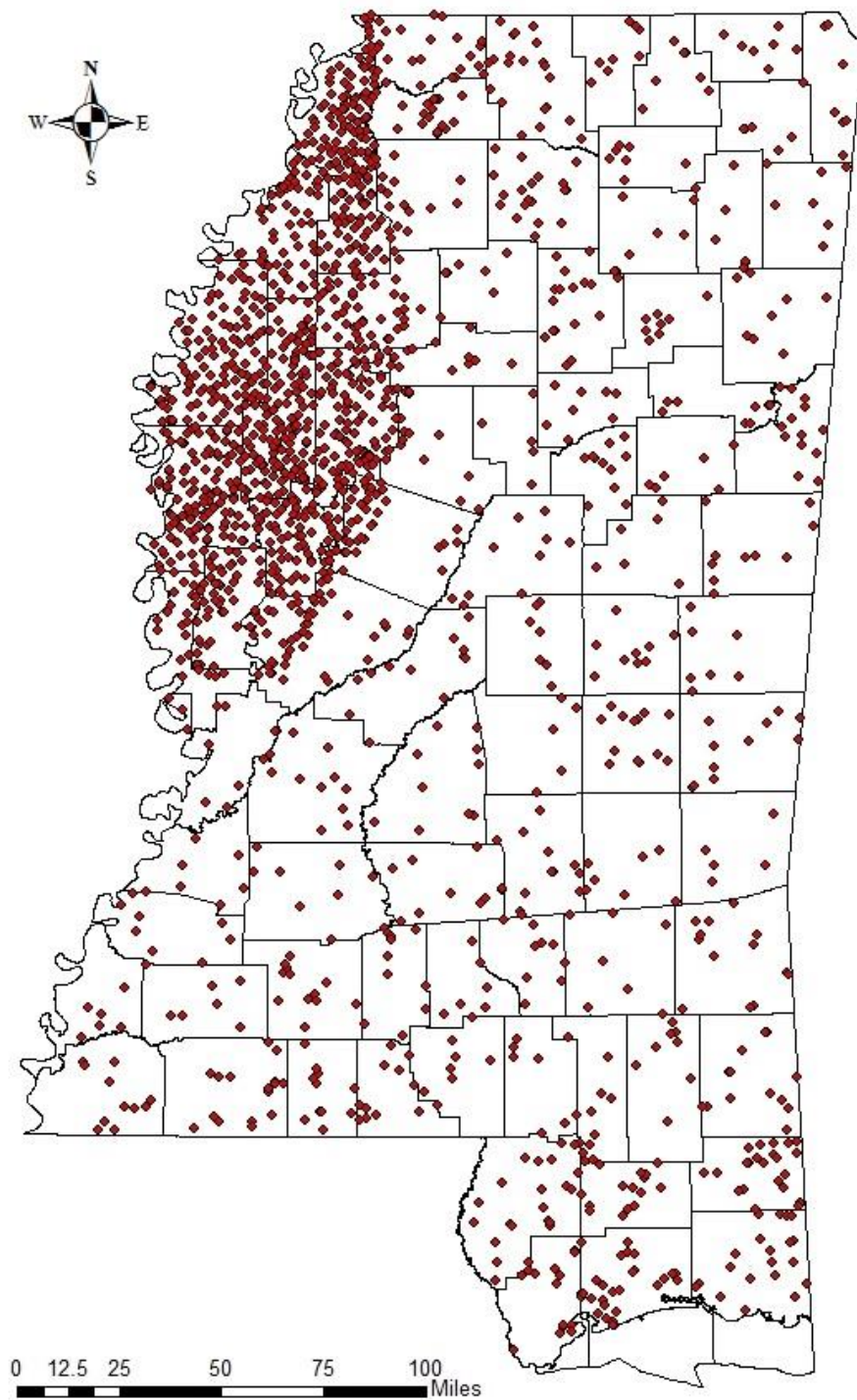
In order to better determine the potential impact of agricultural chemicals on groundwater, a proposal to develop an Agricultural Chemical Groundwater Monitoring Program (AgChem) was formulated in 1986. This proposal was initiated by several organizations including the Delta Council, Mississippi Farm Bureau, National Agricultural Chemicals Association and others. As a result of their efforts, Mississippi Senate Bill 2778 was passed and became effective July 1, 1987. In summary, this legislation required the MDEQ, formerly known as the Department of Natural Resources, to establish state groundwater standards and to monitor groundwater in the state. The legislation also allowed the Mississippi Department of Agriculture and Commerce to increase registration fees on pesticides and fertilizers to defray the cost of administering the program, and to take corrective action in the event it was determined that agricultural compounds are impacting groundwater resources in the state.

Initially, sampling was conducted on shallow drinking water wells located in areas of highest concentration of agricultural practices, before expanding into other areas of the state. In 1993, sampling was expanded to include other sources of water such as irrigation, fish culture and wildlife management wells. Flowing artesian wells and springs also provide valuable sampling locations as they originate primarily from shallow groundwater sources. Since the program's inception in March of 1989 through December 31, 2015, a total of 1,891 samples have been collected throughout the state. Of this total, 869 have come from drinking water supplies, with all 82 counties of the state being represented. Samples from these drinking water wells have been analyzed for more than 100 pesticides and metabolites.

In addition to drinking water supplies, a total of 1,022 agricultural samples (irrigation, fish culture and wildlife management) have been collected. These samples have been taken from all 82 counties, including all 19 counties in the heavily agriculturalized Mississippi Delta. Water from these locations has been analyzed for the same pesticides and metabolites as drinking water samples. For the first 15 years of the program, many samples were tested for additional compounds, including 45 volatile organic compounds and 30 inorganic compounds, including residues, nutrients and metals. Beginning in January, 2005 arsenic was added to nitrates and phosphates for analyses. In a response to poultry growers' needs, inorganic compound analyses were resumed in 2012.

Results to date appear to indicate that the overall quality of Mississippi's groundwater supply is relatively unaffected by agricultural activities. Of all samples taken to date, 94.7% have no detectable concentrations of agricultural chemicals present. Of the 99 samples with detects, only ten were found to contain concentrations exceeding safe levels (Maximum Contaminant Levels or MCLs) established for drinking water by the U.S. Environmental Protection Agency (EPA). Of the approximately 30 inorganic constituents analyzed, total nitrates are detected most often. To date, only thirteen of the 1,739 sites sampled (0.7%) exceeded the MCL for total nitrates.

Location of Agricultural Chemical Samples



METHODOLOGY

Since there are approximately 60,000 registered pesticide formulations containing one or more of some 700 different active ingredients, it would be prohibitively expensive to analyze for all these compounds. The strategy decided upon by the Mississippi Department of Agriculture and Commerce-Bureau of Plant Industry (MDAC-BPI) and MDEQ to minimize this dilemma was to select a target list of approximately 170 pesticides, metabolites, volatile organic compounds (VOCs), metals, minerals and other inorganics used in common agricultural practices. This approach was patterned after criteria established by the Environmental Protection Agency's (EPA) National Pesticide Survey. Also targeted were some chemicals not necessarily associated with agricultural practices, but of interest to the MDEQ in understanding water quality and characteristics of Mississippi's aquifers.

Targeted constituents were chosen based on the following general criteria:

- Physical and chemical properties of the pesticide
- Quantity applied in Mississippi
- Pesticides of interest identified in the EPA's National Pesticide Survey
- Data from federal, state and local agencies

Once the parameters were defined, statewide sampling began in earnest. At each AgChem sampling site, the location is precisely captured using a Global Positioning System (GPS) receiver. The sites are photographed and instantaneous data relating to the sample's pH, temperature and conductivity are recorded on site. These cursory water properties are used in conjunction with historical well drillers' logs (when available) to help determine the aquifer from which the sample was drawn.



2015 Summary and Results

Summary

For calendar year 2015, MDEQ sampled 39 wells and springs in support of the AgChem Program. This total sample number was down from 46 samples in 2014 and 52 samples in 2013.

Sample numbers remained relatively low in 2015. While continuing to canvas the entire state, the program will return to the Mississippi Delta during the growing season in 2016 to collect and analyze irrigation, fish culture and wildlife water samples.

Results

MDEQ staff collected 39 samples in support of the AgChem Program in 2015. The samples covered 24 counties, from 7 different aquifers, and included irrigation, wildlife and drinking water samples.

Sample Conditions	Number
Total Samples 2015	39
Counties	20
Agricultural Wells	14
Drinking Water	25
Surface Water	0
Aquifers	7

Section I. Agricultural Wells

2015 Agricultural Samples - Organic Detects

Two agricultural water samples in 2015 revealed detects on organic compounds. One of the samples was promptly resampled for a large number of detections, and they were shown to have been false positives possibly caused by a laboratory report error or a contaminated sample. The other sample was attempted to be resampled, but the well had been deactivated for the end of the watering season. It will be resampled as soon as possible in 2016.

Compound	MCL	Sample Detected
Acifluorfen	N/A	0.03 ug/L
Ametryn	N/A	0.0009 ug/L*
Atrazine	3 ug/L	0.085 ug/L*
Atrazine Dealkylated	3 ug/L	0.085 ug/L*
Carbofuran Phenol 3-Keto	40 ug/L	0.0009 ug/L*
Cyanazine	N/A	0.0011 ug/L*
Diuron	N/A	0.0009 ug/L*
Fenamiphos Sulfone	N/A	0.011 ug/L*
Fluometuron	N/A	0.0009 ug/L*
HCH-Gamma	0.2 ug/L	0.08 ug/L
Propanil	N/A	0.0009 ug/L*
Propazine	N/A	0.0009 ug/L*
Simazine	4 ug/L	0.0008 ug/L*
<i>*Later resampled at 0.000 ug/L</i>		

2015 Agricultural Samples - Inorganic Detects

Inorganic Compounds tested for in agricultural wells are as listed in the table below. The 'Historically Exceed' column indicates the percent of total samples taken throughout the program's history that have detects greater than their respective MCLs. Several compounds listed below were re-established as compounds of interest during 2013 due to their importance to poultry and/or root vegetable producers.

Compound	MCL	2015 Samples	2015 Detects	2015 Detects Exceeding MCL	Historically Exceed MCL
Arsenic	0.01 mg/L	14	11	0	6%
Nitrates	10.0 mg/L	14	1	0	0%
Ortho Phosphates	N/A	14	1	N/A	N/A
Total Phosphates	50.0 mg/L	14	9	0	0%
Iron	0.30 mg/L	14	14	7	31%
Chromium	0.10 mg/L	14	3	0	0%
Cadmium	0.005 mg/L	14	1	0	0%
Manganese	0.05 mg/L	14	14	3	2%

Section II. Drinking Water Samples

2015 Drinking Water - Organic Detects

Three drinking water samples in 2015 reported detects on organic chemicals. Two of the samples have yet to be confirmed due to sampling late in the year, and will be resampled as soon as possible. A private drinking water well located in Montgomery County tested positive for Tebuthiuron in both the primary sample and the resample. The EPA has not yet established a drinking water standard for Tebuthiuron, but it will be revisited at a later time as a precaution.

Compound	MCL	Sample Detected
Dicamba	N/A	0.058 ug/L
4-Nitrophenol	N/A	0.037 ug/L
Tebuthiuron	N/A	0.48 ug/L

2015 Drinking Water - Inorganic Detects

The primary inorganic compounds tested for in drinking water samples are as listed in the table below. The 'Historically Exceed' column indicates the percent of total samples taken in the program's history that have detects greater than their respective MCLs. Several compounds listed below were re-established as compounds of interest during 2012 due to their use in the poultry and/or root vegetable industries.

Compound	MCL	2015 Samples	2015 Detects	2015 Detects Exceeding MCL	Historically Exceed MCL
Arsenic	0.01 mg/L	25	12	0	<1%
Nitrates	10.0 mg/L	25	7	0	<1%
Ortho Phosphates	N/A	25	4	N/A	N/A
Total Phosphates	50.0 mg/L	25	13	0	0%
Iron	0.30 mg/L	25	17	10	20%
Chromium	0.10 mg/L	25	1	0	0%
Cadmium	0.005 mg/L	25	1	0	2%
Manganese	0.05 mg/L	25	24	8	19%

CONCLUSION

Based on results to date, there is no evidence that agricultural compounds are significantly impacting the quality of groundwater in Mississippi. The Mississippi Department of Environmental Quality's AgChem Program continues to receive support from federal, state, and regional authorities in support of its mission to protect the citizens of Mississippi by trying to determine if the agricultural use of pesticides, fertilizers and herbicides may be adversely affecting our groundwater quality. By responding to requests from concerned citizens and continuing to build upon two decades of base-line data, the MDEQ AgChem Program will continue activities related to the protection of the groundwater resources of Mississippi.

